Prbh funkce

1 Pedpis funkce:

Pracujeme s relnmi funkcemi:

```
> with(RealDomain);
```

```
Warning, these protected names have been redefined and unprotected: Im, Re, ^, arccos, arccosh,
<br>
```

```
> f := x^3/(x^4+1);
```

$$f := \frac{x^3}{(x,4)+1}$$

2 Vlastnosti

Definin obor (nutno pro kadou funkci zvl)

```
> solve(x^4+1=0,x);
```

Dle limity v bodech nespojitosti (zde uvdme jen pro plnost)

```
> Limit(f, x=a, left)=limit(f, x=a, left);
```

$$\lim_{x \to a^-} \frac{x^3}{(x,4)+1} = \frac{a^3}{(a,4)+1}$$

```
> Limit(f, x=a, right)=limit(f, x=a, right);
```

$$\lim_{x \to a^+} \frac{x^3}{(x,4)+1} = \frac{a^3}{(a,4)+1}$$

Je funkce sud (pp. lich)?je nkolik zpsob, jak ukzat, e je: LICH: f(x) = f(x)

```
> eval(f,x=-x);
> <br>evalb(eval(f,x=x)=-eval(f,x=-x));
```

$$-\frac{x^3}{(x,4)+1}$$

true

```
> iszero(eval(f,x=x)+eval(f,x=-x));
```

iszero (0)

```
> type(f,oddfunc(x));
```

true

nebo SUD: f(x) = f(x)

```
> evalb(eval(f,x=x)=eval(f,x=-x));
```

false

```
> type(f,evenfunc(x));
```

false

3 Prvn derivace

```
> df := diff(f,x);
```

$$df := 3\,\frac{`^`(x,2)}{`^`(x,4)+1} - 4\,\frac{`^`(x,6)}{`^`\left(`^`(x,4)+1,2\right)}$$

```
> NuloveBody := solve(df = 0,x);
```

$$NuloveBody := 0,\ 0,\ `^`(3,1/4),\ -`^`(3,1/4)$$

```
> Rostouc := solve(df>0,x);
> <br>Klesajc := solve(df<0,x);
```

4 Druh derivace

```
> d2f := diff(df,x);
> <br>d2f := diff(f,x$2);
```

$$d2f := 6\,\frac{x}{`^`(x,4)+1} - 36\,\frac{`^`(x,5)}{`^`\left(`^`(x,4)+1,2\right)} + 32\,\frac{`^`(x,9)}{`^`\left(`^`(x,4)+1,3\right)}$$

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Inflexn body

```
> InflexnBod := solve(d2f = 0,x);
> with(Student[Calculus1]):
> <br>InflectionPoints(f);
```

$$[-`^`(6+`^`(33,1/2),1/4), -`^`(6-`^`(33,1/2),1/4), 0, `^`(6-`^`(33,1/2),1/4), `^`(6+`^`(33,1/2),1/4)]$$

Extrmy

```
> eval(d2f,x=0);
> <br>eval(d2f,x=NuloveBody[3]);
> <br>eval(d2f,x=NuloveBody[4]);
```

$$0$$
$$-3/4\,`^`(3,1/4)$$
$$3/4\,`^`(3,1/4)$$

Konvexnost a konkvnost

```
> Konvexn := solve(d2f>0,x);
> <br>Konkvn := solve(d2f<0,x);
```

5 Asymptota se smrnic

```
> k:=limit(f/x,x=infinity);
```

$$k := 0$$

```
> q:=limit(f-x*k,x=infinity);
```

$$q := 0$$

```
> Asymptota := k*x+q;
```

$$Asymptota := 0$$

6 A nakonec graf:

```
> plot([f,Asymptota],x=-10..10);
```

Plot: PrubehFunkce3plot1.eps